



Improving Ordering Processes at Chez Marius Through Data Analysis and Categorization

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<p>The current ordering processes at Chez Marius, a Helsinki-based kitchenware company, date back to the beginning of the company 20 years ago. A lot has changed since those days, which has created a need to improve the ordering processes. While the company is growing, it becomes increasingly difficult to manage inventories manually. Modern ERP systems provide huge amounts of data that should be utilized. Chez Marius needs to find a starting point for ordering process improvements and this project aims to provide that starting point by categorizing company's B2B products with help from an ABC analysis.</p> <p>This project is limited to ordering processes on the purchasing side. The focus was on the items in the B2B catalogue of Chez Marius. The time period for the sales included in the ABC analysis was one year in order to reach a sufficient amount of data.</p> <p>The current situation at Chez Marius was defined by interviewing the owner and one employee. The problems and wishes for improvements were clarified in the same interviews. Based on the wishes from the interviews, sales in pieces was chosen to be the basis for the categorization. The ABC analysis was done by exporting the sales data from the previous year to an Excel file. Excel provided all the necessary attributes to create the categorization.</p> <p>The B2B items were divided into categories A, B, C and D based on their sales amounts. The most commonly sold items were placed in category A. It consisted of 21% of items and they generated almost 70% of sales. Category B items contributed 20% of sales with 30% of items. Category C had 45% of items but only accounted for 10% of sales. Category D was created for new items without any sales. These percentages are in line with theories; a small number of items account for most of the sales.</p> <p>The main improvement suggestion for Chez Marius was to control inventories based on their categories. Items in category A should receive most of the attention. Sales data and the ERP system should be taken more advantage of while all the processes should be standardized. An Excel tool for categorization was created for future use at the company since categorization needs to be done on a yearly basis. The tool was also tested successfully.</p> <p>Through data analysis and categorization improvement suggestions for Chez Marius were achieved. Putting those improvements to use is the next step in developing the ordering processes with more structure and better allocated resources. The wishes of the company owner and employee were reached and the main problems were tackled. Starting with the improvements is the most important thing.</p>	
Keywords Inventory management, ordering, categorization, Pareto's law, ABC analysis	

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1 Introduction

What happens when the resources at a small company are limited, but the company is growing steadily? What if purchasing and ordering have always been done in a certain way, but that way does not seem sufficient for the future? What should the company do in order to improve its processes and performance within a certain aspect of its operations? This thesis project will take a closer look at the ordering processes at Chez Marius, a kitchenware company based in Helsinki. The goal is to provide the company with improvement suggestion for their ordering by identifying problems in their current processes and focusing on their most important items based on sales numbers through an ABC analysis.

In this chapter, the key issues of this thesis project, its background and the case company will be introduced. First, the background and the need for the project will be presented. After that, the project objective and project tasks will be presented in more detail with the project scope, followed by benefits of this project for different stakeholders. Finally, the key concepts will be presented before the chapter is closed with the information of the case company, Chez Marius.

1.1 Background

Purchasing plays a big role in an organization's success. It affects the costs as well as profitability. (Van Weele 2014, 3.) Generally, in bigger companies, purchasing is often handled by the purchasing department with the help of data from an enterprise resource planning system (ERP). ERP is a system, where all the main processes of a company, like accounting, HR and supply chain management, are integrated into one database. This way all the data exchange happens in real time and all the information is available for all departments. (SAP, 2018.) However, these systems are not necessarily available for smaller companies, which can lead to making orders and purchases based on feeling alone. There are some benefits to this; professional knowledge in a speciality store and being able to predict and act according to trends faster. Still, not using the available data can cause issues with surprising stock outs, over reacting to individual peaks in demand and making orders that are too large.

During the author's employment at Chez Marius, all of the issues mentioned above have occurred. They have caused problems with customers because of backorders and problems with inventory value and warehouse management. When thinking about the purchasing function, the main focus with Chez Marius and this thesis should be in ordering. Van Weele specifies developing purchase order and handling routines as a part of main activities that the purchasing function covers. (Van Weele 2014, 8.) Developing the ordering

routines could benefit the company by smarter inventory levels, ability to respond to customer demand and ease of work for the employees. The author sees that there are multiple ways to improve the ordering processes from analysing sales data all the way to purchasing requisitions.

Going more in depth with purchasing and ordering gives the author a good understanding of the topic and prepares him for the future with more competencies to work within the field of supply chain management. Understanding the basics of an issue has always been important and offering a company a working solution to a specific problem in their processes is beneficial for both parties. This also shows that the author is capable of handling a project this big. The author's professional goals at the moment are within purchasing, which is one more reason for implementing this project.

1.2 Project Objective

The project objective of this thesis is to suggest improvements for the ordering processes of Chez Marius by utilizing the data available on sales, purchases and inventories while simultaneously decreasing the reliance on doing orders based on feeling. The used data specifications will be chosen by the owner and a key employee of the case company. An Excel tool will be created to help with the categorization in the future in order for Chez Marius to continue with the suggested improvements. The thesis is divided into five project tasks.

PT 1. Creating the theoretical framework.

PT 2. Establishing the current state of order processes at Chez Marius and interviewing personnel on the needs and wishes regarding the development of ordering processes.

PT 3. Analysing and categorizing products. (ABC analysis).

PT 4. Creating the Excel tool for categorization and planning suggestions for new order processes based on the categorization, wishes and needs.

PT 5. Testing the Excel tool and evaluating project outcome and project management.

Table 1 below presents the theoretical framework, project management methods and outcomes for each project task.

Table 1. Overlay matrix

Project Task	Theoretical Framework	Project Management Methods	Outcomes
PT 1	ABC analysis, categorization, inventory management, Pareto's law, ordering	Studying textbooks and journals	Theoretical framework
PT 2	Qualitative interviews	Qualitative interviews	Current processes, system and development goals
PT 3	ABC analysis, categorization of products, data gathering	Analysis based on gathered secondary data on sales, purchases, inventories, working with Excel	Analysis and categorization of products
PT 4	Ordering processes, purchase orders, inventory models, inventory management	Working with Excel, ordering process research, working with company's system	Creating the Excel tool and suggestions on new order routines and processes
PT 5	PT1-4	Evaluation, discussing outcomes	Testing the Excel tool and evaluation of project outcomes and project management

1.3 Project Scope

The project scope will be limited to the ordering issues, including purchase orders and data utilization. Contracting, supplier selection, expediting and other aspects included in purchasing function will not be discussed or researched. The thesis will include product categories, which will be created by using the ABC analysis. The analysis will reveal the most important products for the company, which is a great starting point for ordering process development. (Institute of Management Services, 2017.) The ABC analysis will also provide the foundation for future development possibilities at Chez Marius. With the help of the Excel tool, the company can do the ABC analysis with less effort in the future.

This thesis project will concentrate on developing the ordering processes of Chez Marius in to more reliable and professional direction. There will be some mentions about costs, but cost reductions are not a goal of this project. Ordering costs have the most influence on ordering at Chez Marius, which is why they will be mentioned later on. The new ordering processes will not be implemented and tested during the thesis project, but it is up to

the case company to do so later. The Excel tool however, will be tested for future use. The main focus will be in purchase orders related to B2B products.

1.4 Benefits

The case company will achieve multiple benefits. These include better control on orders, clearer ordering processes and product categories based on data analysis. With the provided Excel tool, categorizations can be done yearly with little effort. One major benefit for Chez Marius will be that this thesis project will provide the company information and experience to expand the improved ordering processes beyond the B2B catalogue products if the company so wishes. Improving the ordering processes at this stage would be beneficial for desired future growth. Customers can achieve better availability for products, less backorders and less waiting time.

On a general level, this thesis project can provide information about ordering processes in small companies. Discussing problems, possible solutions and improvements can help other companies and businesses to identify similar situations. Often small companies do not have the resources for in-depth analysis and research, which is why even basic findings can be helpful. The author will gain project management skills, deeper understanding about ordering processes and experience about product categorizing. This thesis will provide him with knowledge and tools for future professional career within purchasing.

1.5 Key Concepts

Ordering refers to making purchase orders to suppliers based on terms agreed earlier or placing an order directly to supplier and accepting their conditions. Ordering is part of purchasing process and order function. (Van Weele 2014, 30.)

ABC analysis reveals the importance of an item on the inventory and this way makes categorization of products possible thus giving tools for different levels of control in accordance of the importance. (Arnold, Chapman & Clive 2008, 280).

Inventory management means the actions taken to keep the right number of items in the inventory. The goal for inventory management is to make sure that production and sales are uninterrupted with the lowest possible cost. Problems with inventory management may contribute to big losses since for many companies the inventory is one of their biggest assets. (BusinessDictionary 2018.)

Pareto's law states that a small portion of the products often dominate the results. Regarding inventories, this often means that a small percentage of products cause most of the costs or generate most of the profits. ABC analysis is based on Pareto's law. (Arnold, Chapman & Clive 2008, 271.)

Product categorization helps to create smaller and more specified groups of products based on their characteristics. These groups often reveal important aspects which otherwise could be lost within the mass of averages. (Sakki 2009, 89.)

1.6 Case Company

Chez Marius is a kitchenware retail company founded in 1997. The company has a store in central Helsinki and a warehouse and an office in Lauttasaari. The case company offers consumers, professionals and restaurants high quality cooking items. Chez Marius also imports products from multiple countries and does B2B sales with other companies in their field as well as some large department stores. The company has been growing steadily to around 1,5 million in revenues and having personnel of 7 employees. (Kauppalehti 2018.) In early 2017, second Chez Marius store was opened in Tallinn.

First ideas regarding this thesis came from author's own work experience at the company. After discussions with multiple persons at the company, the need for the project seemed more and more obvious. Moving business practices to more professional direction at this point, before expanding the business, can be seen as a smart move. In a speciality store like Chez Marius, ordering needs to have human influence because of trends and request for new products. But having data backing up and helping with the process is something that was mentioned especially by the person in charge of B2B sales and orders.

2 Combining analysis and categorization for improved ordering processes

Ordering can be a challenging aspect of purchasing to develop or improve. Often companies have their own processes which have been developed throughout the years, either based on the used technology and ERP systems or pure professional knowledge. This leads to ordering being almost like an automated process where there is just one way of doing it. But once the issue is examined with a wider view, there are some key areas that seem to be repeating. Figure 1 shows these areas and their relations.

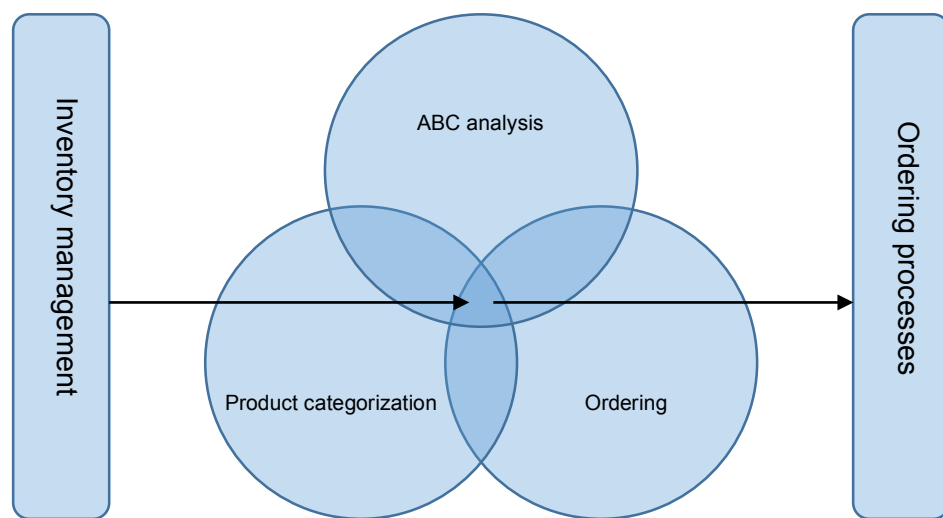


Figure 1. Relations of different theoretical framework parts on improving ordering processes at Chez Marius

Inventory management is the basis that needs to be understood to create a general understanding. Pareto's law, ABC-analysis and categorization are all aspects which can lead to better understanding of ordering. Once all of the areas are understood well enough, a company can start to create and improve their own ordering processes. On the left in figure 1 is the main issue, inventory management, which consists of all the smaller concepts. In this thesis project, ABC analysis leads to product categorization. Both of these are used to find the most important products to focus on regarding ordering. Combining all the parts should lead to better ordering process suggestions for Chez Marius. Theories for each of the main components will be presented in this chapter. A more detailed description of ordering processes at Chez Marius can be found in chapter 3. Chapters 4 and 5 discuss the other components of figure 1 in relation to the current situation at Chez Marius.

2.1 Inventory management

The main goal of inventory management is to handle the number of items in inventory, both within a company and also in within the supply chain (Bozarth & Handfield 2008, 14). With Chez Marius, one of the main development aspects is to avoid excess inventories as well as stock outs due to failures in ordering or surprises in customer demand. This all leads to the need of having the right number of products in stock, while simultaneously minimizing costs related to inventories. An extremely broad product selection at Chez Marius means that inventory is a huge resource and asset for the company. At the same time, it causes a lot of costs to control.

Murphy and Kneymeyer (2015, 149) identify three main costs related to inventory management: carrying costs, ordering costs and costs of being out of stock. Carrying costs contain multiple different components from storage costs to insurance costs. Carrying costs are indicated as a percentage of the value of the inventory. Ordering costs are the costs which are related to the actual ordering, like transportation costs. Carrying and ordering costs are related through the amount of orders and the size of orders. Stock out costs occur once inventories run out. These costs are difficult to calculate, because they can consist of penalties, loss of sales and loss of customers. (Murphy JR. & Kneymeyer 2015, 151.)

The main cost affecting ordering at Chez Marius is the ordering cost. This is because of the way Chez Marius is making their orders. Many of the suppliers have offered free transportation when making orders that are large enough in value. With the rest of them, the transportation costs are pretty well known in advance. All of this makes the transportation costs the dictating issue when it comes to ordering cycles and order sizes at Chez Marius.

Successful inventory management requires inputs from various sources. Internal sources include IT department and finance division. Often in smaller companies there are no separate departments for IT and finance. However, these aspects still have significant role in inventory management due to technological issues and liquidity aspects. External sources include suppliers and customers. Suppliers provide information about availability of products and lead times, which can make inventory management more efficient. In this thesis, lead time means the time between sending the purchase order to the moment the order is received. The buying behaviour and feedback from customers can guide inventory management to reach its goal of having the right products, in the right place with the right quantity. (Bozarth & Handfield 2008, 14.)

Lysons & Farrington (2016, 293) state that one of the main goals of inventory management is to provide the needed service levels in quantities and order fulfilment rates. This is one of the several special issues in inventory management concerning ordering. The need of avoiding stock outs might lead to massive orders which are too large for the company and cause extra costs. In those cases, safety stocks can become too large. Safety stocks mean the inventory held to avoid stock outs. The goal of safety stocks is to eliminate most of the stock outs. (King 2011, 33.) On the other hand, using fixed order intervals for convenience and simplicity can make the company unable to react to changes in demand and face stock outs or overflow of stock. All in all, there is not one easy and general solution for inventory management, especially considering ordering. (Murphy JR. & Kneymeyer 2015, 158.)

As mentioned earlier, inventory management requires inputs from company's IT systems or department. Tikka (2016, 54) discusses order point, or alarm limit, as a very important tool for managing inventories. Figuring out an order point for a product and using it as an automated part of ordering requires IT systems. An order point should be set for each item. The order point can be either a certain number of items in stock or a certain time in between orders. The latter is often called order period. For maximum effect, both can be used simultaneously. These should be used especially when the number of items in an inventory is high. Order point and order period will be discussed more in the ordering –subchapter.

2.2 Pareto's law

A small number of items often account for a large part of revenue, profits or problems. This phenomenon is known as Pareto's law, or 20/80 rule. Pareto's law states that most of the results are caused by a small number of causes (Arnold, Chapman & Clive 2008, 270). The 20/80 rule explains this with an approximation that 20% of items generate 80% of revenue or profit. It needs to be kept in mind that these numbers are estimates, and they can vary. It is most important to understand that the relation should be closer to 20/80 than 50/50. Pareto's law can be found in various fields of study. (Sakki 2009, 90.)

Figure 2 shows a visual representation of the Pareto's law. Only two of the ten items in figure 2 generate 80% of total sales. With the cumulative percentage line and the 80% marker, it is easy to see whether or not the Pareto's law is true.

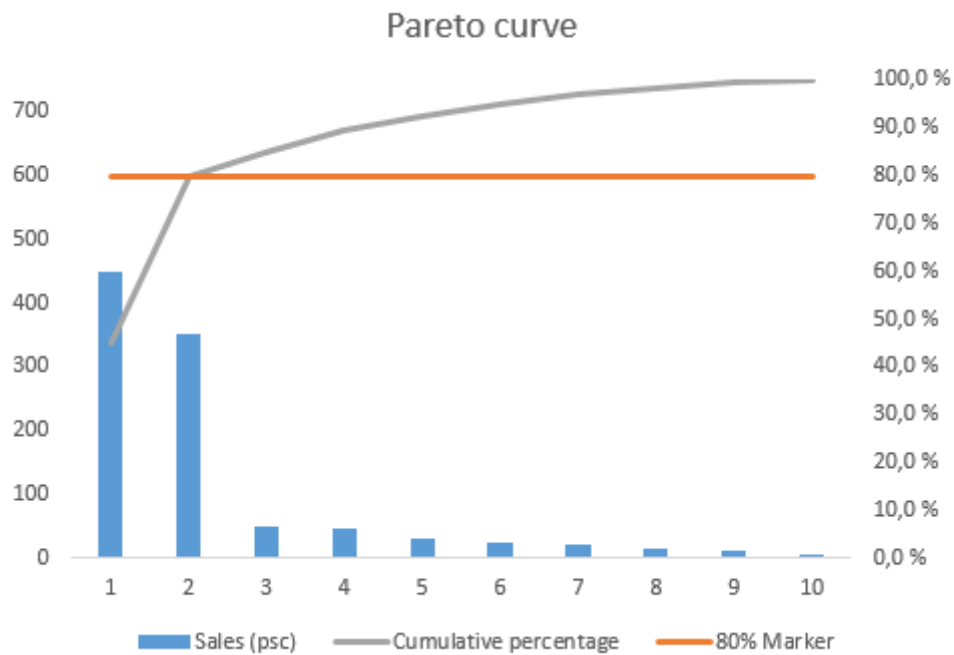


Figure 2. Pareto curve shows sales in pcs and the cumulative percentage of sales in pcs

Pareto's law gives an excellent introduction and basis for the ABC analysis. Different items have different importance, which leads to the outcome where different categories are needed for allocating resources where they really matter. According to Pareto's law, most of items may not bring significant profits or cause problems. It is the few vital ones that have a more significant impact for a company that should be studied in more detail. Still it should be kept in mind that the level of importance, or the lack of it, should be studied more carefully than on just the 20/80 –level. (Sakki 2009, 91.)

2.3 ABC analysis

As the Pareto's law implies, different items have different impact and importance. Inventory management is basically about controlling the individual items in the inventory. To do this, certain issues have to be clarified. ABC analysis is one simple, but effective way to control the inventories (Tikka 2016, 52). It provides answers to questions like how important an item is and what type of control should the item have when it comes to inventory management. (Arnold & al. 2008, 270.) Richards and Grinsted (2016, 14) state that ABC analysis can be done using data received from a company and Excel. This makes the ABC analysis simple and easy to approach.

Items vary in importance also when observing them with different qualifications. For example, some items may bring majority of a company's revenue, which causes them to be the

most important ones when revenue is the decisive factor. On the other hand, when thinking about the importance of an item for customers, the results can be different. Even without making a lot of money, a product can be vital for a company's customer, which makes the situation completely different. (Murphy JR. & Kneymeyer 2015, 158.)

Defining the qualifications to focus on with the ABC analysis is the first thing to do before moving forward to categorization (Arnold & al. 2008, 271). As discussed above, different companies may value different factors because of their values, vision or customer expectations. Understanding the business, what is important and what is not, creates the basis for the ABC analysis.

Items are then divided in to groups, or categories, according to the specified criteria. The name ABC analysis is just a guideline. If needed, more groups can be used to specify the ABC analysis (Sakki 2009, 91). Through the categorization of items, management can focus on the important ones and it is possible to choose the right ordering method for each group (Richards & Grinsted 2016, 122). Next, the groups in ABC analysis, possible actions for each group and some problems with ABC analysis will be discussed.

2.3.1 Groups in ABC analysis

Arnold & al. (2008, 271) provide a simple example for the ABC inventory control grouping. They use traditional A, B and C groups. Group A consists of 20% of items, but generates 80% of revenue. Group B consists of 30% of items, but generates only 15% of revenue. Group C consists of 50% of items but those items generate only 5% of revenue. Just looking at these numbers, it is clear that group A should receive most of the attention, even if it consists of only 20% of the items. On the opposite, group C should receive just general, occasional attention due to generating only 5% of revenue. Group B lands in between, which means that they are more important than the items in group C, but not as critical as items in group A.

Lysons & Farrington (2016, 295) use the same 80/15/5 percentage share in their example, which is shown in table 2. In order to find the items for each group, some data is needed: item numbers, unit cost and annual demand. Rest of the analysis can be done with calculations based on this data. In real situation the number of items is much larger. Fortunately, software like Excel can easily calculate the percentages and make the categorization easy even with a huge amount of data. (Lysons & Farrington 2016, 296.)

Table 2. ABC analysis and groups for 10 products (Lysons & Farrington 2016, 295)

Product	% of items (cumulative)	Sales (pcs)	% of total sales (pcs)	% of total sales (cumulative, pcs)	Group
1	10	7200	48,8	48,8	A
2	20	4800	32,5	81,3	A
3	30	9000	6,1	87,4	B
4	40	672	4,5	91,9	B
5	50	440	3,0	94,9	B
6	60	384	2,6	97,5	C
7	70	128	0,9	98,4	C
8	80	120	0,8	99,2	C
9	90	90	0,6	99,8	C
10	100	24	0,2	100	C
Total		14758	100%	100%	

For the example in table 2, the sales have been calculated by multiplying annual demand by unit cost. Then the percentage of total sales has been calculated for each product. Once the products are in declining order, the cumulative sales can be calculated. Finally, a group for each product can be set. This is a really simplified example. With Chez Mar-
 rius, there will be around 800 items to analyse.

The example above illustrates the importance of categorization when it comes to inventory management. The goal for an ABC analysis is to figure out where to allocate resources (Sakki 2009, 91). In the example, if all the groups would have the same amount of attention, the company would be missing potential from products in group A. At the same time, too much effort and money would be allocated for products in group C. Through this type of analysis and categorization, the management can focus on the critical 20% that generate the most revenue. Regarding inventory management and ordering, dividing items in to different groups gives management information on how to choose actions towards different items. (Murphy JR & Kneymeyer 2015, 158.)

According to Tikka (2016), each group should have written instructions on how their inventories are monitored and controlled. This way anyone who interacts with items in the inventory knows what to do with items in each group. Next some of the actions that can be taken with different groups are discussed.

2.3.2 Possible actions based on groups

Using the example from above, there are actions or guidelines to follow with each group. Materialsmanagement.info (2017) provides some general advice varying from the level of control needed, safety stock size and number of suppliers to data accuracy. Naturally, most important items in group A would require the most control. As an example, weekly or even daily monitoring and ordering might be required. The level of control decreases when moving in to groups B and C. By monitoring the inventory levels and ordering more frequently, safety stock in group A can be very low. This way the carrying costs are reduced significantly. Items from group A should have as many suppliers as possible because of the importance of the items. The most accurate data possible should be used with group A, whereas group C can be handled even with rough estimates. (Materialsmanagement.info 2017.)

The items in group A are often the most expensive ones. Strict control on these items extends to the number of items in inventory. The inventory numbers need to match accounting. Because the safety stock should be low, constant deliveries and short lead times are desired. With group A products, the sales forecasts need to be precise and current. (Tikka 2016, 54.) Main actions to group B products are basically less intensive versions of the ones to group A. Having a reasonable safety stock is the main difference. (Tikka 2016, 54.) Group C requires different types of actions due to their lower value. Big safety stocks make sure that stock outs with group C items do not ruin the more important items in group A. Inventory levels can be followed on a case level, which requires significantly less monitoring compared to strict inventories on item level. (Tikka 2016, 54.)

2.3.3 Problems with ABC analysis

As discussed earlier, the results from an ABC analysis can be helpful for a company and its management. There are some possible issues as well. The analysis is reasonably flexible and more like a guideline. Whoever is doing the analysis can decide on the categorization qualifications, the groups used and the percentages of items in each group. The ability to customize the analysis may cause confusion with staying on point and focusing on the important aspects. There are no right or wrong answers, neither is there a general percentage amount for each group. However, the help gained from the ABC analysis may be lacking if the guidelines are not followed. (Murphy JR & Kneymeyer 2015, 158.)

In addition to ABC analysis, professional knowledge is needed because of specific issues. For example, an item sold twice a year can be such an important one that it needs to be kept in the selection. The ABC analysis also only shows the past. The analysis can show

different results every year. If new products are added, placing them in the existing groups can be extremely challenging. This is why placing new products in their own group is strongly suggested. (Sakki 2009, 92.) With a large number of different items, it can be tempting to use groups of products to make the categorization faster and easier. This should be avoided because it can distort the results. The goal for the ABC analysis is to find small details from a large number of items. (Sakki 2009, 91.)

One critique about the ABC analysis relates to the amount of resources allocated to different categories. Generally, category A items have been controlled the most and category C items the least. However, it is those slow moving and least valuable items in category C that risk the most challenges because they do not really generate a lot of revenue, but they might tie a lot of resources in their stock value when the inventories are too big. Items in category A on the other hand move really fast, which means they can be sold rather quickly even if their stock gets too large. (Slack, Chambers & Johnston 2010, 365.) This idea contradicts with the general idea of the ABC analysis and the actions based on its categories.

2.4 Categorization

Categorization of items is the result of the ABC analysis. As already discussed above, identifying the critical items from the less important ones provides the possibility to allocate resources and strategies for each of the categories separately. Business is often divided to multiple parts and aspects. These include customers, suppliers and items among others things. Each of these aspects can consist of huge amounts of data, which is why categorizing them further can help a company to understand and monitor the big picture. At the same time, categorization helps to see the differences and exceptions within the big picture. Averages can cause mistakes and misunderstandings which can be avoided with categorization. (Sakki 2009, 89.)

2.5 Ordering

Ordering is part of the purchasing function and order function. Ordering contains placing the order to suppliers which are selected beforehand, developing the purchase order routine and handling of the order. (van Weele 2014, 8.) Orders can be placed to the supplier based on the terms agreed with them, or agreeing to suppliers' terms without questioning their conditions (van Weele 2014, 30). As stated earlier, ordering is a big part of inventory management. Ordering will be discussed in more detail in the following subchapters.

2.5.1 Ways to handle ordering

Ordering generally takes place when something is needed. Whether it is a product, part of a product, a service or something else that a company cannot produce on their own, it is often ordered from a supplier. Orders can be done in an electronic form through an ERP system in a way of a purchase requisition or manually in a more traditional way (van Weele 2014, 40). This manual way of ordering is often done in small companies. The need for something may occur when an employee physically notices that the inventory is low or by monitoring the inventory levels electronically.

Order point and order period were briefly discussed earlier. Order point, or period, prevents the issue of a stock out because of accidentally forgetting to order something. Order point, which means a number of items left in the inventory, is set for a product. This number is the quantity of items sold during lead time plus the safety stock (BusinessDictionary 2017). Once this point is reached, the item is added to an open order or a purchase requisition is made. Order period works the same way, but instead of a number of items in inventory, a certain time between orders is set. For example: if the order period is three weeks and if there has been three weeks since the last order, the item is added to an open order or a purchasing requisition is made. Order point and order period are useful and simple ways to improve ordering if the data used matches the actual inventory numbers. (Tikka 2016, 55.)

2.5.2 Problems in ordering

From the author's own experience, human error is always a possibility when not relying on data from an IT system. Missing an item which is low on stock, ordering too many items by accident and putting too much emphasis on changes in customer behavior can all create problems. Trusting blindly on an ERP system can also be problematic. New trends do not necessarily show up in sales data immediately whereas a human can anticipate those changes.

Tikka (2016, 56) provides an example of how trusting IT systems too much can create overly large inventories. As useful as an order point and an order period can be, they need to be set up using enough timely and precise data. If the limits are set too carelessly, the negative outcomes can outweigh the possible positive effect. If the limits are not updated regularly, the old limits do not necessarily match the new sales data, which can lead to the orders being too big and inventories to increase.

3 Current state and wishes at Chez Marius

Understanding the current situation of ordering and inventory management at the case company Chez Marius is important for finding improvement areas and achieving results. The current state will be discussed in relation to the main theories: How inventory management is viewed in the company? What should be the qualifications for the ABC analysis and categorization? How is the ordering done the moment? What kind of problems has the company faced with ordering and inventory management? The data collection and the ABC analysis will be done based on the current state and the company's wishes.

The methods for the current state research are discussed next. The current ordering process and reasons behind that are explained in the following subchapters. The main problems the company has faced with the current ordering process and their wishes for improvements are studied as well. The chapter ends with a discussion about the findings and which parts to focus on with the ABC analysis and ordering process improvements.

3.1 Methods for studying the current state

The author personally has a strong knowledge about the inventory management and ordering at Chez Marius because of his own work experience at the company. He will be reflecting some of his own ideas and experiences since they are directly connected with the issues discussed earlier about the problems in ordering. However, the main sources for the current state and wishes were the owner and founder of Chez Marius and one of the employees. The author needed their insights about the ordering processes. Especially on why the process is what it is today.

The owner of Chez Marius has 20 years' worth of experience from the field. This professional knowledge was extremely valuable, and the author will have to be able to connect the theories discussed earlier to the ideas and wishes of the company. Majority of the data needed for the current state came from a qualitative interview and discussions with the owner and the employee. The interview questions can be found from the form in appendix 1. With the owner, focus was on the history, problems and wishes for improvements. With the employee the focus was on the current process, problems and wishes for improvements.

Qualitative interview was used because the company's point of view was needed. It is their actions and decisions that have created the current situation and their wishes that

will guide the improvement suggestions. As Bryman and Bell (2007, 425) state, by doing qualitative research, the case company stayed in charge of what is important for them and what is not. Another reason for choosing qualitative research is that contextual understanding and beliefs of the business were needed from the owner. Qualitative research provided these as well. (Bryman & Bell 2007, 426.)

3.2 Current state

Orders at Chez Marius are done from two different locations, depending on which supplier the order is placed to. Suppliers whose products are sold only at the store are ordered mainly from the store by the employees or the owners. Products that are listed in the B2B catalogue are mainly warehoused and ordered from the office and warehouse by the employee in charge of the B2B sales. Most of these items are sold at the store as well. In this thesis, the focus is on the products that are in the B2B catalogue. This is why the focus is on the ordering process that takes place at the office with the B2B products. Ordering process improvements that are successful for Chez Marius can later be implemented to the orders made from the store as well.

3.2.1 Ordering process at the moment

Ordering at Chez Marius is currently extremely manual and relies on the person doing the order to know what to order and how much. This knowledge comes from the everyday work in the company. The employee responsible for the ordering of B2B products knows the demand and sales of those products on a general level. Sales data can be checked from the ERP system, but checking each item separately can be time consuming. Some of the B2B products are sold at the store and some products from the same suppliers are sold only at the store. Because of this, the person doing the ordering needs to be aware of the inventory and demand situation at the store as well.

The orders are placed to different suppliers almost daily. Orders to some suppliers are sent on a weekly basis, but most of them less frequently. There are two main ways how the need for a purchase order (PO) is noticed: while going through the inventory levels of the suppliers with weekly ordering, or noticing some products running low on inventory while picking items for sales orders. Both of these require active monitoring of inventory levels, which increases the possibility for not noticing the need for a purchase order.

When the need for a purchase order is noticed, inventory lists for the supplier are printed out. The lists provide information about the current inventory levels, reserved items and items that are in transportation. The person doing the order chooses the amounts to order and

marks them to the list while using the information on the lists as help. Next step is to check special orders for products which are not in the company's normal selection. These need to be marked separately and created in to the ERP system. Most of these special orders are made from the store, which increases the need for effective communication between the store and the office.

Once the order amounts are in the list, a purchase order is created in the ERP system. Each item and amount is entered manually from the list to the purchase order. The special products can be created to the system at this point. The purchase order is then saved in to the ERP system and sent to the supplier. Figure 3 shows the current ordering process of Chez Marius from the point of noticing a need for a purchase order to sending the purchase order to the supplier.

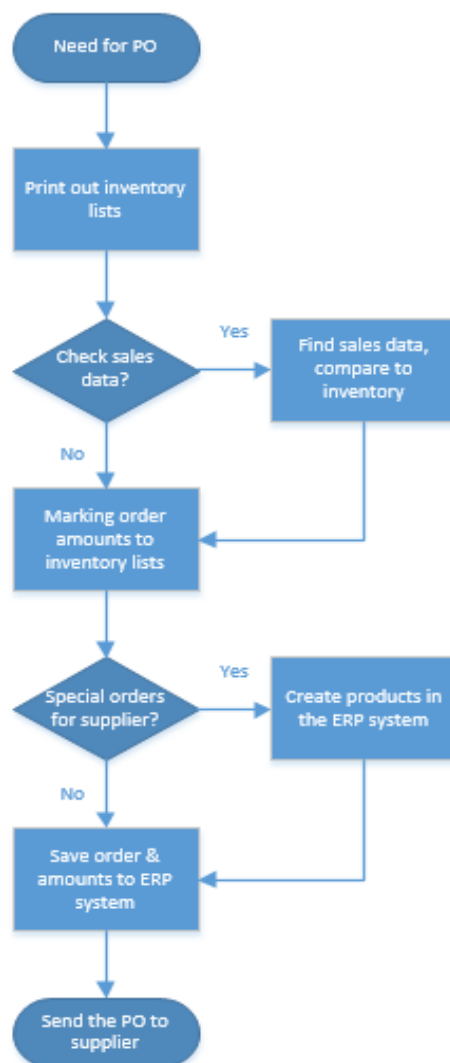


Figure 3. The current ordering process at Chez Marius

After this, the supplier confirms the order and any missing items are highlighted to the order. Once the order is shipped and the shipment arrives at the warehouse, the contents of the shipment are compared against the delivery note or the purchase order. If something is wrong or missing, the supplier is contacted. When everything is OK, the order is received and purchase order closed. The items are added to inventory by the ERP at this point. Overall, there are many steps in the current ordering process that could be improved from using data to support decision making to avoid doing same things multiple times. Unnecessary steps and possible problems often occur in the beginning of the ordering process described in figure 3. Figure 4 shows the later part of the current ordering process, from receiving order confirmation to accepting and closing the purchase order.

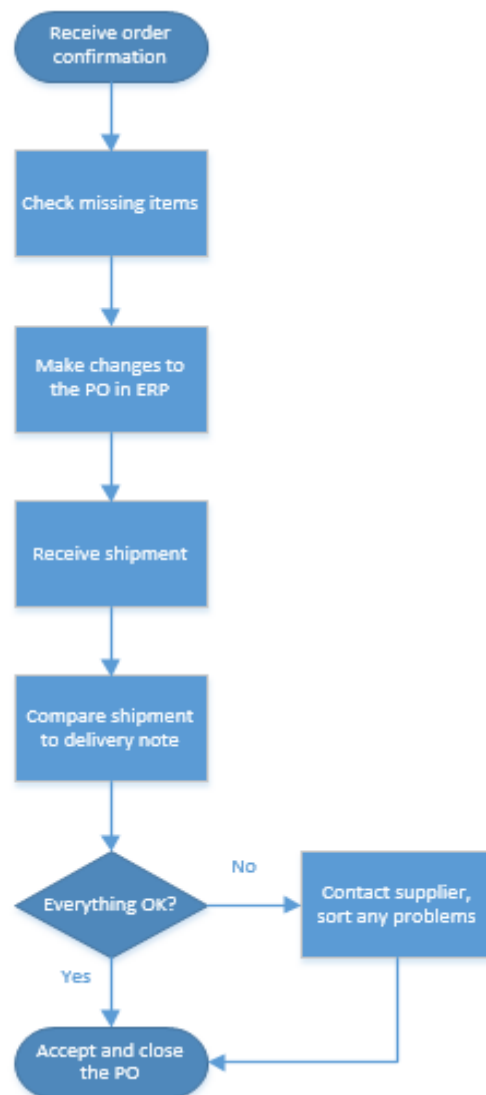


Figure 4. The later part of the current ordering process from order confirmation to closing the PO

The ordering process is divided into figures 3 and 4 because most of the problems and possible improvements focus on the earlier part in figure 3 where Chez Marius is making the decisions and taking actions. This is where the focus of the improvement suggestions will be. What has led to the ordering process being as described is discussed next.

3.2.2 History behind the current ordering process

The main focus in the interview with the founder and owner of Chez Marius was in the history of their ordering process and how he would hope to improve it. According to the owner, the part of their current process in figure 3 is a result from their previous ERP system. With that system, the fastest and most effective way was to look at the inventory levels and do the whole purchase order at once. Opening a purchase order and adding items to it later as needed was not possible.

Inventory lists were not used in Chez Marius from the beginning. Their sales volumes and product amounts were so much smaller, that the owner could write down the order from scratch and check the inventories at the storage room. At some point it was inevitable to add the inventory lists to the process because of the increasing product selection. Generally, everything that is done within the ordering process has started in the early days of the company.

3.2.3 Problems with the current situation

As mentioned in the thesis background, Chez Marius is constantly facing purchasing and ordering related issues. These issues include problems with customers due to backorders and overly large inventories that cause extra work to get rid of and costs to hold in the storage. Ordering too much creates difficulties with space in the warehouse and store. Many of the problems Chez Marius is suffering from could be avoided, or at least minimized by more refined inventory management practices, some of which were already discussed in the theoretical framework.

Main issues that the employee and the owner of Chez Marius raised in the interviews and discussions were concerning the lack of data when ordering and difficulties with estimating the demand. Not having the sales data easily accessible for ordering seemed to cause extra work and guessing. Multiple reason can cause the difficulties in estimating demand. When ordering a new product, one can either try to compare it to a possible substitute product and its sales or just estimate the demand based on trends or other criteria. In Chez Marius, this often leads to ordering a small test batch in the beginning.

On the B2B side the main problem is that customers may order big quantities of products with low sales only once. This often happens with customers' projects or campaigns and has caused problems in the past with differentiating normal demand from the campaigns. Another issue is the small size of many B2B customers. They order many different items, but in small amounts. This means that the selection needs to be good, but the inventories can not be too big because of the small volumes. This leads to challenges in balancing between big and small customers and their orders.

Trends were mentioned as one challenging aspect because they can come out of nowhere. Consumers see something interesting on TV or internet, which leads to a big peak in demand that goes down equally as fast. Chez Marius has faced this time and time again. The owner of Chez Marius mentioned that some products sell well in cycles of couple years. So the demand can be very much like waves, but estimating the length of a peak is extremely difficult.

The special orders and items that are sold only at the store have caused the most problems with ordering. The communication between the office and store can be lacking, and too many persons might be handling the information and quotations. This has lead to information not reaching the required person regarding the order and items left missing from orders. The customers for these special orders are often waiting for the items, which is why it should be a top priority to not miss these items.

3.3 Wishes

Main improvement wishes from the employee were about getting support from previous sales data when doing the orders and better estimations about demand. According to the employee, this would make ordering less about guessing and more about facts. All help regarding decision making would be appreciated.

The owner of Chez Marius was focusing more on taking full advantage of the relatively new ERP system in his wishes. The ERP has been used from June 2016. As an example, he mentioned the possibility to open a purchase order immediately once something is noticed to be running low on stock. This would work with the special orders as well, and it would make sure they would not be forgotten to order. Order points, or alarm limits, were discussed as well. They would make sure that the most important items would never be missing from a purchase order. His idea was that in time, order points could be used for the most important items, but even more so with the items that are ordered less frequently. He backed this idea with the statement that the most important items are being ordered as a routine, which means that they are less likely to be forgotten.

3.4 Discussion

It is clear that there are some challenges and problems with the current ordering process at Chez Marius. The employee and owner have different views on problems and possible improvements. In this situation it is nice to have opinions from two different roles at the company. It gives the author better understanding about the administrative and the operative level. The opinions from the owner reveal some issues about the past as well. Combining the history, reasons for the current ordering process, problems and possible improvements gives tools for chapter 5 about the improved ordering process suggestions.

The current ordering process described in figures 3 and 4 is relatively standardized. It is done in the same way time and time again. This provides a nice foundation for improvements, because with standardized processes problems can be easily specified (Trauman 2009). As in this case, lack of easy access to sales data makes using the data as support in decision making challenging. Checking sales data is one part of the current process which could possibly be improved.

The current situation has its foundation in the past. Ordering process has been this way because of some limitations of the old ERP system. One main aspect that was mentioned up by the owner was to take advantage of the improvements the new ERP system offers. These include more flexible purchase orders and possibility for order points for each item. Having data to support decision making is something that can be improved in the employee's opinion. Issues with estimating demand are concerning other aspects than ordering as well. Tackling those issues would require a more thorough study on the whole business.

All in all, the current situation has its limitations when it comes to ordering and improving the ordering process. ABC analysis will reveal the importance of items in more depth, which helps to allocate resources regarding the ordering process improvements. Next chapter will discuss the ABC analysis, following with a chapter about the possible improvements for ordering process at Chez Marius.

4 ABC analysis and categorization

Improvements for ordering process at Chez Marius will begin with understanding the importance of the company's products. The company has a strong understanding about the quality of its products, its product range and what type of offerings it needs to have for different customer segments. However, Chez Marius is missing the data on sales presented in an easy, accessible format. The data is available in the ERP system, which makes the ABC analysis possible. With the analysis, the items can be categorized and prioritized based on criteria requested by Chez Marius. In this chapter, the methods for ABC analysis, the ABC analysis itself and categorization based on the analysis will be discussed.

4.1 Methods for the ABC analysis

The ABC analysis will be approached with quantitative research. With the help of data, relation between theories and the research itself will be tested (Bryman & Bell 2007, 28). As mentioned in the project scope, the focus of the ABC analysis was in the products of the B2B catalogue of Chez Marius. At the moment of the project, the catalogue contained 776 items. 50% of the items without sales numbers were new, which is why they did not have any sales data yet. Those were placed in their own group. Items which have been in the catalogue for longer time, but for some reason did not have sales numbers, were placed in the same group with the new items. All the sales data was available in the company's ERP system. Sales data could be found in euros, number of items sold, item groups and by supplier. The sales data was exported in Excel as a CVS-file. Sales figures from October 1st 2016 to September 30th 2017 were used. This way a full calendar year was analyzed, which is the length suggested for ABC analysis (Sakki 2009, 91).

The sales figures of one year were exported from the ERP system as one document, which included the number of items sold and sales in euros. Both were included in the analysis, but the categorization was done according to number of items sold. From the request of Chez Marius, sales in euros were used to justify the categorization choices. The exported CVS document contained all of the items sold at Chez Marius within the selected time frame, which meant having around 3500 items to work with. The Excel version of the B2B catalogue was used to match the 776 of B2B item numbers with the CVS file. The result was an Excel file with item numbers, names, number of items sold and sales in euros. This file was used as a template for the ABC analysis itself. In the following chapter, the main steps and results after the finished ABC analysis will be discussed. Some of the main findings will be shown with figures.

4.2 ABC analysis

With all the B2B catalogue products with the sales data in one document, the beginning of the ABC analysis was to sort the items in descending order based on the sold amounts. Next the percentages of sales for each item were calculated. Following that, cumulative percentages for each item were calculated, and each item were given a number based on the order. With this number, each item had the same share of the 776 items in the list. As a result, cumulative sales could be easily compared to the percentage of items to see whether or not the Pareto's law applies to the sales of Chez Marius. The main information of the ABC analysis and the most sold items are shown in figure 5.

	C	H	J	L	N
1	Item	Sold (pcs)	% of sales (pcs)	Cumulative sales (pcs)	Cumulative % of items
2					
3	1	3206	5,57 %	5,57 %	0,13 %
4	2	1568	2,72 %	8,29 %	0,26 %
5	3	1177	2,04 %	10,34 %	0,39 %
6	4	1119	1,94 %	12,28 %	0,52 %
7	5	937	1,63 %	13,91 %	0,64 %
8	6	894	1,55 %	15,46 %	0,77 %
9	7	862	1,50 %	16,96 %	0,90 %
10	8	727	1,26 %	18,23 %	1,03 %
11	9	694	1,21 %	19,43 %	1,16 %
12	10	644	1,12 %	20,55 %	1,29 %
13	11	635	1,10 %	21,65 %	1,42 %
14	12	556	0,97 %	22,62 %	1,55 %
15	13	554	0,96 %	23,58 %	1,68 %
16	14	519	0,90 %	24,48 %	1,80 %
17	15	489	0,85 %	25,33 %	1,93 %

Figure 5. The most sold items at Chez Marius shown in the ABC analysis document

Figure 5 shows the top 15 items sold from Chez Marius' B2B catalogue. The columns with all the needed information are visible in the figure: items, sales in pieces, percentage out of all the sales, cumulative sales percentages and percentage of all of the items. There is other information in the hidden columns, but those are for the company's own use. The top 15 items already count for 25% of the cumulative items sold. This strengthens the theories about a small number of items having a big effect on the whole product range. Figure 6 shows the point where cumulative percentage of items reaches 20%.

	C	H	J	L	N
1	Item	Sold (pcs)	% of sales (pcs)	Cumulative sales (pcs)	Cumulative % of items
155	153	89	0,15 %	67,67 %	19,72 %
156	154	89	0,15 %	67,82 %	19,85 %
157	155	88	0,15 %	67,98 %	19,97 %
158	156	88	0,15 %	68,13 %	20,10 %
159	157	87	0,15 %	68,28 %	20,23 %
160	158	87	0,15 %	68,43 %	20,36 %
161	159	87	0,15 %	68,58 %	20,49 %

Figure 6. The cumulative top 20% of items account for over 68% of all items sold

Figure 6 displays the fact that sales at Chez Marius do not quite match the Pareto's law with 20% of items contributing for around 68% of sales. However, it is still clear that significant part of the sales is generated by a small number of items. A challenging trend related to categorization can be seen from the ABC analysis, which is also visible in figures 5 and 6: after the top 15-20 items, the differences in sales amounts are really small. For example, difference in sales between items 130 and 170 is just 20 pieces. Because of this, the professional knowledge and experience from Chez Marius and the author are needed in order to do the categorization, especially between groups A and B. The most benefit from the ABC analysis can be achieved with big enough effort put in to the categorization.

Sakki (2009, 91) presents the need for a group for items, which do not have any sales during the timeframe of the analysis. Therefore, as mentioned earlier, there will be a fourth group besides groups A, B and C. The group D will be for the products which are new or do not have any sales data from the selected timeframe. Out of 776 items, 31 have no sales data at all. Most of them are new items in selection, but few of them have been in the catalogue for a longer time. Items in group D are specialty items at this point. Their progression should be monitored in order to assign them to other groups once a new categorization is done. The items with no sales are shown in figure 7.

	C	H	J	L	N
1	Item	Sold (pcs)	% of sales (pcs)	Cumulative sales (pcs)	Cumulative % of items
745	743	1	0,00 %	100,0 %	95,75 %
746	744	1	0,00 %	100,0 %	95,88 %
747	745	1	0,00 %	100,0 %	96,01 %
748	746	0	0,00 %	100,0 %	96,13 %
778	776	0	0,00 %	100,0 %	100,00 %
779					
780	Total	57499	100,00 %		

Figure 7. Items 746-776 have no sales during the inspected timeframe. Hidden rows between rows 748 and 778 contain items 747-775

Items in figure 7 could all be in group D, since the ones which sold only 1 piece do not generate sales on any significant level. But from the point of view of Chez Marius, as a special kitchenware store, they need to have certain items in stock for true niche markets. From Chez Marius' owner's experience, customers expect some special products that can not be found anywhere else. Having these items in selection at Chez Marius is a conscious decision, which is made to serve customers with wider selection.

Figure 7 also shows the total number of B2B catalogue items sold in column H. 57499 pieces in total were sold during the selected timeframe. This information was used in the analysis to find the information for column J, which was the percentage an item has sold out of all the sales. With all the sales information in the ABC analysis, categorization of the B2B catalogue items was done. In the next chapter, the categorization of items will be discussed in more detail: what are the sizes for each category and how the items were assigned to each group.

4.3 Categorization

As mentioned earlier, there are many ways to categorize items after ABC. Traditional A, B and C categorization is often used. In this project, group D was added for new items and items without any sales. Groups A, B and C were created based on the amount of items sold, because of a wish from Chez Marius. Amounts sold is important to Chez Marius because it reveals the items that have potential to be sold in big volumes. Those are the items Chez Marius can consider trying to find a manufacturer for in the future instead of buying from suppliers.

Pareto's law discusses the 80/20 relation. Some suggest using that as a base for the categories in ABC analysis. As an example, group A would have 20% of items that account for 80% of the sales. Group B would consist of 30% of items that account for 10% of sales.

Group C would consist of 50% of items and those would account for the final 10% of sales. (Slack & al. 2010, 363.) To make the difference between groups even more obvious, the percentages could be following: group A with 20% of the items with 80% of the sales, group B with 30% of items with 15% of sales and group C with 50% of items with only 5% of sales (Arnold & al. 2008, 271).

As it is stated earlier, there is no right or wrong answer on how to assign different items to groups. Most important part is to find the right amount of group A products, because most of the resources will be allocated for those. (Murphy & Kneymeyer 2015, 158.) The categorization for B2B catalogue items of Chez Marius started with group D items, since they were the easiest to identify from the file seen in figure 7 above. Next task was to identify the important items that belong to group A. This was done by going through the ABC analysis list from the top until 60-80% of cumulative sales were reached. In the 60-80% range, items were handled individually to find the right spot to make the differentiation between groups A and B.

The most difficulties were with items that could be set in either group A or group B based on their sales numbers. A lot of time and effort went in to the process of deciding where the borderline for groups A and B was set in the table. After that, some of the items were individually changed in each group A and B. This was done because of high monetary sales value, importance of the item for Chez Marius or possibility for a substitute item. Figure 8 shows the categorization results from Excel.

Group	Items	% of items	Sales	% of sales
A	166	21,4 %	39851	69,3 %
B	227	29,3 %	11891	20,7 %
C	352	45,4 %	5757	10,0 %
D	31	4,0 %	0	0,0 %
	776	100,0 %	57499	

Figure 8. A, B, C and D categories based on the ABC analysis of Chez Marius B2B catalogue items

From the figure 8 it can be seen that category A consists of 166 items with the sales of 39851 pieces. Percentages are 21,4% and 69,3% respectively. Category B consists of 227 items with sales of 11891 pieces. Percentages are 29,3% and 20,7% respectively. Category C contains 352 items with sales of 5757 pieces. Percentages are 45,4% and

10,0% respectively. Category D consists of 31 items with no sales. Percentage for category D items is 4,0%. Next all the categories will be gone through individually with some of the key characteristics of the items within them.

4.3.1 Category A items

As mentioned earlier, category A items are the ones which a company should allocate most resources and attention to. They are also the items that contribute most in revenue, sales amounts, are the most important for a company or require the most control. (Tikka 2016, 53.) It is natural, that these items are found at the top of the ABC analysis once it is sorted in the right order. For Chez Marius, this order was the number of items sold. These items are the most important ones for couple of reasons: they are often times the kitchen essentials (such as knives, frying pans, cutting boards etc.) and they are the items, which can be sold in big volumes. This means that even if the price of the product is not high, larger volumes can make up for it. Category A items have sold thousands and hundreds of pieces per item for Chez Marius during the selected timeframe.

Figure 8 shows that total of 166 items were assigned to category A. That is 21,4% out of all the B2B catalogue items. They account for over 69% of all items sold. This is relatively close to most of the theories about ABC analysis. Lysons and Farrington (2016, 294) state that percentage of category A items should be 20%. Annual usage however should be around 80%, which is not the case here. Possible reason for this could be the broad selection of items and even spread of sales after the top 15-20 items. Detailed information about the sales for the items in category A can be found in the ABC analysis Excel in appendix 2 (confidential).

4.3.2 Category B items

Items in category B fall between the least important ones in category C and most important ones in category A (Tikka 2016, 52). Dividing items to A and B categories was challenging. With the author's experience working with the items and about the business of Chez Marius, differences between A and B category items were achieved. These differences were the importance of items and possible substitute items. Some items have the potential to be in category A, some might land in category C in the future. Category B items have sold less than hundred pieces per item for Chez Marius. More detailed information about the sales for items in category B can be found in the ABC analysis Excel in appendix 2 (confidential).

With Chez Marius, 227 items belong to category B. This means 29,3% of items and 20,7% of number of items sold. These numbers are in line with ABC analysis theory. Lysons and Farrington (2016, 294) state that category B should contain about 30% of items and account for 15% of the sales. This time, when comparing the results to theory, the percentage of sales is higher with Chez Marius. Same possible reasons apply as with category A: the broad selection and even spread of sales between the items.

4.3.3 Category C items

Category C contains items that are the least important for a company. This means the items with smallest amounts sold, as well as the least valuable items. (Tikka 2016, 52.) For Chez Marius this meant items with maximum of 30 pieces sold within a year. These items are the ones that are not too common for everyday use in kitchen, but are required for a specialty store to have. Items which have been sold only a few times during the year might seem useless, but they might be the decisive factor for some customers (Sakki 2009, 92). As an example, having spare parts for expensive items can reassure the customer that their needs are taken care of even after the purchase.

With Chez Marius, as shown in figure 8, category C consists of 352 items. This is 45,4% out of all the items. They account for 10% of all the sales. These numbers go in line with the previous categories when comparing to theory. Lysons and Farrington (2016, 294) state that category C items should include around 50% of all items. Annual usage for these items should be around 5%. Other theories state that items in category C should have around 10% of total usage (Slack & al. 2010, 363). This shows the varying characteristics of the ABC analysis. Difference between the ABC analysis for Chez Marius and the theory comes from the addition of category D, which has the missing 4% of the items in it. Again, wide selection of items and even spread of sales might contribute for the differences in sales between the case analysis and theory.

4.3.4 Category D items

Category D was added to the ABC analysis for Chez Marius because they had multiple items that did not have any sales data. Some of these items are new in selection, others simply had no sales during the year. New items require their own category since it would require huge amount of knowledge and luck to determine beforehand how important those items will be. Some of the old items without sales data can be important for customers, as discussed in the previous chapter. New items will be assigned to categories in the future analyses, but as of now, they belong to category D. (Sakki 2009, 92.) With Chez Marius,

category D had 31 items, which accounts for 4% out of all the items. These items will have different impact in the future, once their demand and importance will be discovered.

4.4 Discussion

The ABC analysis for Chez Marius on their B2B catalogue items provided results which were generally well in line with the main theories. The 80/20 relation of Pareto's law was not exactly matched, but the general idea of a small number of items contributing majority of the sales was in fact visible with the items of Chez Marius. In the author's opinion, the broad selection of products might have caused the evenly decreasing sales after the top items. Especially with the focus on B2B sales at Chez Marius, the customers try many different items in small amounts in order to find what works in their selection.

Pareto's law can be monitored through ABC analysis (Sakki 2009, 91). Sales amounts in pieces were decided as the main characteristic to investigate. Sales in euros were kept in the analysis to support the categorization with challenging items. The analysis itself was straightforward: sales data was exported from the ERP system of Chez Marius. It was then matched with the B2B catalogue in order to eliminate extra items. Items were sorted in to order by the percentage of sales they had. Cumulative percentages for sales and number of items were then calculated. As shown in figures 5-7, the main theories of ABC analysis were matched with some differences: the most commonly sold items were clearly visible, the top 20% of items contributed for almost 70% of all sales and some of the items did not have any sales data.

The categorization was achieved through the ABC analysis. The specifics of categories A, B, C and D can be seen in figure 8. There were some difficulties in assigning items to the categories, especially with some items that were between categories A and B. With these, the author used his own experience from the products to finish the categorization. As an example, Chez Marius is very well known for their selection and knowledge on Japanese knives. Lead times with these knives are very long, especially with one supplier requiring orders months ahead to optimize their production schedules. In categorization, some knives would have been in category B based only on their sales numbers, but because of the special aspects mentioned above, they were assigned to category A. Japanese knives are also fairly expensive, which causes their part of revenue streams to be high even with lower sales volumes.

Most of the difficulties faced either during the ABC analysis or the categorization seem to be caused by couple of reasons. Firstly, as mentioned earlier, Chez Marius has 776 items in their B2B catalogue. Secondly, many of the B2B customers are small resellers, who

buy many different items in low volumes. This seemed to cause a really even spread of sales number between all the items, excluding the top 20 items. These two reasons made the categorization decisions challenging from time to time.

Most of the theories, as well as the example of the ABC analysis in table 2 discuss only small amount of items. In reality, the situation is totally different and decisive factors and differences seemed to be more difficult to find. In the end, categories were achieved and in the following chapter the improvement suggestions on the current processes will be given based on the results of the ABC analysis and the categorization. An Excel tool for updating the categories in the future will be introduced as well.

5 Excel tool for categorization and suggestions for improving the ordering process

Figure 1 illustrated the relation between inventory management, ordering, ABC analysis and categorization. These four combined should provide solutions for more efficient ordering processes. The main theoretical issues were clarified in chapter 2, the current state of ordering at Chez Marius was described in chapter 3 and the ABC analysis and categorization were discussed in chapter 4. Following chapters will tie all of these aspects together in order to find possible improvements for the ordering process at Chez Marius. As mentioned in the project scope, these improvements will not be implemented as a part of this thesis project, but it will be up to the company to do so in the future if it so wishes.

In order for Chez Marius to update the ABC analysis and categorization in the future an Excel tool was created. The aim for the tool is to help Chez Marius to categorize their products in an easy and efficient way. Categorizing items yearly is important because the top items will most likely be different each year. New items are added all the time and the new items from previous years will have enough sales data to place them in to the right category. This way it is possible to avoid getting stuck in the history with the same categories year after year. (Sakki 2009, 92.)

The creation and use of the Excel tool will be explained in the following subchapter. Later some main theories for actions based on the ABC analysis are presented and discussed in relation to this project. These are the actions that are suggested for Chez Marius to take in order to improve their ordering process. The author will use his own experience on the issues while discussing whether or not the theories can be applied fully, need to be adjusted or do not work at all regarding the situation at Chez Marius. The chapter will end with a short discussion on findings and the possible improvements they might provide.

5.1 Excel tool for categorization

As mentioned in chapter 4, the ABC analysis was done by utilizing data from the ERP system of Chez Marius and using Excel to filter, sort and calculate the sales amounts and percentages. Most of the steps described chapter 4 can be implemented in one Excel tool so that only the source file for sales amounts needs to be updated once a new analysis and categorization are required. Even though the Excel tool is relatively simple, it makes the categorization a lot easier for the company since the knowledge on using Excel is not currently too strong at Chez Marius. Making the categorization as simple as possible increases the chances of Chez Marius doing it in the future.

The Excel tool is based on the ABC analysis that can be found in appendix 2 (confidential) and was described earlier in chapter 4. Some changes were made in order to make the tool as simple as possible. Focus was still on the B2B catalogue items. Some items were deleted from the catalogue during this project, which is why the number of items in the tool was a bit lower than in the original analysis. The main spreadsheet in Excel contains the item number and name. With that information, the data from the sales report can be exported.

The sales report is copied to the same file as the tool is in and the data found with the following INDEX and MATCH –formulas: =IFERROR(INDEX(ChezMarius-SalesXXXX!B\$2:B\$4000;MATCH(\$C4;ChezMariusSalesXXXX!A\$2:A\$4000;FALSE));0). The XXXX will be replaced with the year of the sales data. Main adjustments that may be required in the future are regarding the items in the B2B catalogue. When something gets deleted or added to the catalogue, the item list in the Excel tool should be updated accordingly. The tool can be found in appendix 3 (confidential).

Besides the formulas, there are some basic calculations in the tool: the percentages and the cumulative percentages, because these are needed for the categorization. Categorizing the items is left to whoever uses the tool. Groups have their own column where A, B, C or D is typed based on percentages and experience with the products. This part is left to the user because of need for product knowledge and room for interpretation. A separate table, similar to figure 8, shows the summary of the analysis and categorization. The table updates automatically with the sales figures once the groups are assigned in the tool based on the updated sales.

With the tool, it is possible to sort the items either by sold pieces or sales in euros. Sold pieces have been used throughout this project, but having sales in euros helps with categorization challenging items between two groups. The tool will be tested and the results will be explained in chapter 6. The following subchapters will discuss the improvement suggestions for Chez Marius based on the categories or groups. Updating these groups on a yearly basis should give the company a really good basis for the following improvements.

5.2 Controlling inventory based on the categories

Once the ABC analysis and categorization are finished, there are some general suggestions on how to control the inventories of different categories. Arnold & al. (2008, 273) provide two main rules to follow: have plenty of category C items and use resources to reduce the inventories of high-value items in category A. High control with A items means

frequent monitoring of inventory levels, accurate records and frequently done accurate demand forecasting. Orders should be done on a weekly basis. C items with low control should have plenty of stock and simple records. (Arnold & al. 2008, 274.)

This goes together with the fact that often times category C items are least valuable in money and category A items are the most valuable. This means that carrying extra inventory for category C items is not that expensive, so there should always be some supply available. It is possible to order bigger amount of C items at once, and focus resources to more important items. Category A items have more importance, which is why they should be monitored and controlled all the time. (Arnold & al. 2008, 273.)

Category A items at Chez Marius are the most important and expensive ones. The company should all the time be aware of the demand and inventory levels in order to fulfil the demand. Stock outs should be avoided, but not with the cost of overly big inventories. Orders should be done frequently and in reasonable amounts to avoid extra costs. As an example of controlling A category items, we can take items 11 and 12 from figure 5. Those are revolutionary cutting boards from a Spanish supplier. The demand is relatively steady without peaks. At the moment, orders for this supplier are done monthly. In the future, they should be done every other week, or even weekly. This way Chez Marius can have control over inventories, less time between orders and smaller holding costs. This would even help with less important items, since they could be added to orders more often, which would make possible stock outs shorter.

At Chez Marius, C items should be ordered less frequently and in bigger amounts in relation to demand. The most commonly sold items in category C have sold 31 pieces within a year. Many of these items are ordered in packages of 6, which means that even the smallest order amount can last over two months. Chez Marius wants to keep delivering customer orders fast, which is why category C items should be in stock. One inventory policy for C items is to have only one in stock and reordering after it is sold. This would cause a stock out situation after every customer order, which is not wanted at Chez Marius. (Collington & Vermorel 2012.)

The main goal with category B items should be in following their potential and monitoring whether they move closer to category A or category C (Collington & Vermorel 2012). When it comes to controlling category B items, Chez Marius should keep moderate control and stay aware of the inventory levels and act when stocks are getting lower (Tikka 2016,

54). In the author's opinion, controlling category B could stay similar as this far. The improvements for category B items would come from the next subchapters concerning data utilization, ERP system and standardized ordering processes.

5.3 Help from data and ERP system

The current ordering process and its history are linked to the old ERP system of Chez Marius. The new ERP system offers larger variety of reports to be exported and utilized. It is also more flexible when it comes to purchase orders and provides the possibility for order points and purchase requisitions. The idea of taking more advantage of the new ERP system was brought up by the owner of Chez Marius and the data utilization by the employee. The author agrees with both of these issues.

The first and easiest way to improve the ordering is to start opening the purchase orders earlier than just before sending them. The order should be opened immediately when something is needed and sent once the order is big enough. Special orders from the store should be done the same way: either by opening a new purchase order or adding the items to existing one rather than leaving a note to order something with the next order. A purchase order could be opened via purchase requisition as well, but this requires the order points to be assigned at least for the category A items.

Order points for items have long been a discussion topic at Chez Marius. For example, when to order and how much. In reality, the topic is quite complicated since there are so many items to order at once. It has been challenging to decide on where to start utilizing the order point. After the ABC analysis and categorization, the natural thing would be to start with category A items because planning the order point is an important part of supply chain management. In order to set the point, Chez Marius needs to know the lead times for each supplier, lead time demand for the category A items and safety stocks for those items. (TradeGecko 2017.) Setting the order point is possible because of all that data is exportable from the ERP system.

Lead times should be defined from the previous orders and daily demand from sales reports. With those, the lead time demand can be calculated. Safety stock can be defined from purchase and sales order history. The order point should be then calculated by adding together the lead time demand and safety stock. (TradeGecko 2017.) Order point can then be set for each item individually. Once the inventory level of an item reaches the order point, a purchase requisition is done and the item can be added to a purchase order. The whole idea of an order point fits well to Chez Marius. It helps the person in charge of ordering to decide when to order a specific item.

One criticism towards order point came from the owner of Chez Marius. They have been ordering manually throughout their history, which has worked for them. In his opinion, the ordering should not be automatized too much because trends and fluctuations in demand are more easily noticed by a person instead of a system. In the past, before current volumes and product selection it was easier to order everything manually. In the beginning, order points should be used as a support for their way of doing the ordering. The salespersons and owners know the trends and demand of different items relatively well, but it will get more and more challenging with the growth of the company.

Weekly or monthly sales data from the ERP system should be used to monitor the demand, especially with category A items. Changes in demand can affect ordering, which is why it would be beneficial to have frequent reporting. This would require some effort, but with right kind of Excel templates the sales data can be easily interpreted. The request for the data in support for ordering came strongly from the interviewed employee. According to him, it would decrease guessing and provide tools for better decision making. Having sales data for category A and B items available every time when an order is being made and using it the same way every time would benefit current and future employees. The Excel tool presented earlier in this chapter provides help with yearly categorization, but the author sees possibilities in more frequent reporting as well.

5.4 Standardized process

In order to take advantage of the improvements discussed above, a lot of work has to be done. Even though the ordering process at the moment is somewhat a standard, it is not described anywhere and different employees might feel differently about the process. This can cause troubles when employees need to fill in for each other during holidays or sick leaves. If the ordering process was completely standardized to the level where it would be clear to everyone, it would be easy for everyone to place the purchase orders in a consistent manner. (Partida 2013).

In order for the ordering process to be standardized, it needs to be documented. All the steps should be written down as instructions in a way that even a new employee could manage to do the purchase order. This would help with everyday ordering as well as with spotting problems within the process. Developing the process even further would have better starting point when the process is standardized.

5.5 Discussion

The improvement suggestions for Chez Marius regarding the ordering process are focused on two main issues: controlling inventories based on the categories achieved through the ABC analysis and using sales data and ERP system to their advantage. At the moment, majority of the items are considered as equal. With the results achieved during this project, resources can be allocated to the most important ones. In the future the company has actual data and evidence about the sales on their B2B catalogue items. Suggestions above are on a rather general level. In the author's opinion, considering the company culture, it would be best to begin the improvements with small and basic adjustments and then expanding those later.

Using the ERP system to the fullest and utilizing the sales data with ordering will require some training for employees who take part in the process. This is why the ordering process should be standardized to the best possible level. Calculating the order points for category A items will be a big task, but once done, should make ordering easier for everyone involved. However, constant monitoring of the order points should be happening.

The most important part of this project turned out to be the Excel tool for categorization. During the process of doing the ABC analysis and figuring out the improvement suggestion for ordering processes, the author realized that in order for the improvements to be longer lasting Chez Marius should update the categorization each year. With the help of the Excel tool, it is only a question of exporting the sales data and updating the source file in the tool.

6 Evaluation

This thesis project had multiple tasks that required theoretical framework as well as project management. Completing those tasks resulted in an Excel tool for categorization and improvement suggestions for Chez Marius regarding their ordering process. The testing of the Excel tool, project management methods and outcomes will be discussed in this chapter. Testing of the Excel tool was done in order to see whether or not it works in an efficient way and is simple enough to use.

6.1 Testing the Excel tool

The Excel tool was tested with the sales from beginning of November 2017 to the end of January 2018. Three months is not the suggested length for an ABC analysis, but a quarter of a year including Christmas sales should give enough data to see whether or not the tool itself works. As with the original ABC analysis, the sales were exported from the ERP system as a CVS file with item numbers, sales in pieces and sales in euros. The file was copied to the tool file in to another spreadsheet named ChezMariusSales2017. Naming the file by year makes it possible to save the old sales sheets when adding new ones.

Searching the sales to the categorization sheet is done with the following formula: =IFERROR(INDEX(ChezMariusSales2017!B\$2:B\$4000;MATCH(\$C4;ChezMariusSales2017!A\$2:A\$4000;FALSE));0). The red parts of the formula will change every time a new sales report is added to the file. The name of the sheet containing the report that is under inspection is put where the red text is. Then the formula is copied down to the end of the tool and Excel searches the sales from the sales data sheet to the analysis sheet.

The sales report of November 2017 to January 2018 contained 2864 items. At the time of testing the tool, B2B consisted of 757 items. All of those items had sales between 882 to 0 pieces and the tool retrieved those sales numbers to the categorization sheet. After that, the data was sorted by sold pieces from biggest to smallest. Percentages of sales and cumulative percentages were calculated by the tool. Next step was to assign groups for each item. Because this stage was just to test the Excel tool, groups were divided without too much of in-depth contemplating. Figure 9 shows the summary table from the Excel tool.

Group	Items	% of items	Sales	% of sales
A	174	23,0 %	12707	75,0 %
B	207	27,3 %	3015	17,8 %
C	301	39,8 %	1231	7,3 %
D	75	9,9 %	0	0,0 %
	757	100,0 %	16953	

Figure 9. Summary table from the Excel tool after testing

Figure 9 shows relatively similar results for the Excel tool testing as those in the original ABC analysis shown in figure 8. 23% of the items contribute for 75% of the pieces sold, which is in line with the theories discussed earlier: a small number of items contribute for most of the sales. Only thing that differs significantly is the large amount of category D items. This is explained with the shorter time of sales used for the Excel tool testing: three months versus a full year. Quite a few of those 75 items would have sales within a whole year of data.

Overall, testing the Excel tool resulted similar results as the original ABC analysis with much less work. The tool requires only having the right source for the sales that are studied at the moment. With little effort, the tool provides all the data needed for categorizing products based on latest sales. This makes maintaining more efficient ordering processes, like controlling inventories based on the categories, possible.

6.2 Project management

This thesis project was divided in five project tasks (PT) that all required different kind of project management. The overlay matrix in table 1 presents all of the tasks and project management required to complete those tasks. Creating the theoretical framework in PT 1 required studying textbooks, reading articles and searching other sources. All of the main components explained in chapter 2 were achieved through the studies mentioned. Overall, quality sources were found for the theoretical framework, but the quantity of sources remained fairly low because all the required information was found from a few key textbooks. With scheduling, PT 1 required more time than anticipated because of author's work at the company.

PT 2 required management because of the interviews and discussions with the company employee and the owner. Interviews were conducted in fairly quick fashion because of the timetables of the interviewees. A template with key questions was used to guide the interview to main points, but other issues were discussed also from the initiative of the interviewees. Both interviews were hold separately from each other. The author was able to

find the needed primary data for PT 2 and the answers were documented straight to this thesis. Documentation could have been improved for reliability.

PT 3 required understanding of the ABC analysis from the theoretical framework and working with Excel files exported from the company's ERP system. There were no issues with the exported data and all the work with Excel was done in order to have other usage for the data as well than just the ABC analysis. Because of the author's experience with Excel, finishing PT 3 took less time than estimated.

PT 4 was based on findings of PTs 1-3. PT 4 required putting all the necessary pieces together from the earlier parts of the project, which is why all of the PTs were finished in order. Combining theoretical knowledge, findings from research and wishes from the company required more detailed knowledge about the company, business and the products than the author expected. At some points the author's own experience and relation to the case company caused some issues, but generally the extra knowledge proved to be useful.

6.3 Project outcome

The project outcome resulted from the work done for each PT. The goal was to create an Excel tool to help Chez Marius to categorize their items and suggestions on how they should change and improve their ordering process. Chapter 5 discussed the tool and suggested improvements in more detail. Three main improvements were the controlling of inventory and ordering based on the categories achieved through the ABC analysis, taking full advantage of available data in the ERP system and standardizing processes related to ordering.

In order to reach these improvements, the Excel tool provides a simple way to make to categorization based on sales. All in all, the goals set for the project were reached with the project outcomes. All of the improvements can be implemented separately or together, which creates even more possibilities for the implementation.

The author sees all of these improvements as real possibilities for Chez Marius. The resources at the company should be sufficient for implementation and even for more future improvements. It is up to the company to decide whether or not it wishes to put the improvements discussed in use. Some additional outcomes were established during the project as well: Chez Marius can use the data in the ABC analysis when creating their next B2B catalogue or planning marketing activities since it contains all the sales data from the past year.

7 Conclusions

This thesis project will be concluded by summarizing the findings made during the project, discussing the limitations that the implementation of the project had and suggesting further actions to be made based on the findings. The following subchapters are based on the author's experience from the company in relation to the findings during this project. Limitations and further actions will provide information on the risks this thesis project had and the possibilities it opened up.

7.1 Summary

The history of ordering processes at Chez Marius dates back to the beginning of the company. While the company has grown throughout the years, not every aspect of their business has developed accordingly. Trying to run processes the same way after 20 years with minimal development in between can indeed be challenging. The author realized this through his own work at the company, which eventually resulted in this thesis project.

Starting with theories about inventory management and ABC analysis provided the groundwork for the project since the goal was to create suggestions for better ordering processes based on categorization achieved from an ABC analysis. The owner and one employee of Chez Marius were interviewed to achieve information regarding the current situation, problems and wishes for the improvements. The interviews led to the conclusion that even basic improvements would be beneficial for the ordering processes. These improvements were such as utilizing data and the ERP system while ordering and concentrating on the most important items with ordering and inventory management.

The ABC analysis itself was focused on the items from the B2B catalogue of Chez Marius. The results were in line with theories: a small number of items dominate the sales. This provided the foundation for successful categorization. Items were divided in groups A, B, C and D based on their sales. Results of the categorization made the main improvement suggestion possible: controlling inventories based on categories. Earlier all the items received relatively similar attention when it came to ordering and inventory management. In the future, the goal is to allocate more resources to the most important items.

The categorization done during this project revealed the importance for different items from time between October 2016 and September 2017. In order to take advantage of the improvement suggestions in the future as well, the categorization needs to be re-done regularly. Once a year is the suggestion for Chez Marius. Conducting the ABC analysis for the categorization is relatively simple, but some knowledge with Excel is needed. Because

of this, the main result of this project was an Excel tool, which helps making the categorization with as little effort as possible. The Excel tool was tested and it provided similar results to the original ABC analysis with minor differences. Using the tool was simple: exporting the wanted sales data from the ERP system of Chez Marius and only minor adjustments to the formulas were needed.

Overall the project resulted in improvement suggestions for ordering processes for Chez Marius and an Excel tool to help with categorization in order to continue improving the processes. The provided data analysis of sales and categorization could be used in other actions at the company as well with further projects. Those projects and some limitations regarding this thesis project will finish this conclusion.

7.2 Further projects and limitations

The data analysis about the sales numbers made during this project can be used for additional benefits in the future. The most obvious project to follow would be to implement the ABC analysis and ordering process improvements to the whole product selection of Chez Marius. Now only the B2B catalogue has been studied. The author sees this as an interesting opportunity to see whether or not items with B2B and B2C focus differ in a very special field of business. The Excel tool provides excellent possibilities to broaden the ABC analysis and categorization to the whole product selection at Chez Marius.

As an example mentioned earlier, the sales data can help with the new B2B catalogue when it comes to product selection. The ABC analysis reveals the most commonly sold items as well as the least sold ones. The Excel tool can be used to take a closer look at the sales and relations between items during any given time period. Further projects related to inventory management, purchasing or even marketing can benefit from the existing data. The most sold items would often be a good starting point for improvements. As an example, streamlining operations regarding warehouse layout and picking for sales orders would be possible. Most sold items should be placed to most convenient and reachable locations.

Because of the author's history in the company and work experience with the products, some results might be different compared to a complete stranger's point of view. Knowledge about products was beneficial during the categorization, but it might have caused some distortion to the results as well because of the perception the author has about the products. Another limiting factor regarding the project was limiting the scope to only B2B catalogue items. It needed to be done because of the limit for a thesis project.

However, those items have been chosen to the catalogue for a reason. This means that the overall categorization of products would look somewhat different.

7.3 Author's learnings

To sum up the whole thesis project, the author will explain some of his main learnings throughout the whole project. Studying one aspect of supply chain management in more detail than before provided extremely useful insight regarding author's future career. It helped him to understand several connections between different aspects like inventory management, purchasing and logistics. A valuable lesson was also the size of the project. It required the author to manage his time and energy on a new level. Main problems were connected to balancing between full time work and the thesis. Especially because multiple fill-in duties and staff changes took place at Chez Marius during the project. Overall, the timeframe for finishing this thesis got a bit longer than expected, but the results for the company and the project management experience for the author more than made up for it.

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Appendices

Appendix 1

Improving Ordering Processes at Chez Marius Through Data Analysis and Categorization

Thesis interview form 15.11.2018.

Interviewer: Mika Selin (author)

Interviewees:

Marius Saikku, owner of Chez Marius (referred as owner) Questions 3 & 4

Paavo Inkinen, employee of Chez Marius (referred as employee) Questions 1, 2 & 4

1. Describe the current purchase ordering process as detailed as possible. (B2B item suppliers only)
 - a. Explain the steps usually taken while doing a purchase order
 - b. What to order, how much, when to order, why order etc...
 - c. Are there some steps that are not taken every time?
2. What kind of problems have you faced while doing the purchase orders at Chez Marius?
 - a. At which steps of the process described in question 1 have these occurred?
 - b. Why have these problems happened?
3. Why is the ordering process handled in the current way?
 - a. What is the history behind the ordering process?
 - b. Have the available resources affected the processes?
4. What type of improvements would you wish to have regarding purchase ordering processes?
 - a. With current resources and systems
 - b. With additional improvement projects

Appendix 2

ABC analysis (confidential)

Appendix 3

Excel tool for ABC analysis and categorization (confidential)